

General

Guideline Title

ACR Appropriateness Criteria® nontraumatic knee pain.

Bibliographic Source(s)

Bennett DL, Nelson JW, Weissman BN, Kransdorf MJ, Appel M, Bencardino JT, Fries IB, Hayes CW, Hochman MG, Jacobson JA, Luchs JS, Math KR, Murphey MD, Newman JS, Rubin DA, Scharf SC, Small KM, Expert Panel on Musculoskeletal Imaging. ACR Appropriateness Criteria® nontraumatic knee pain. [online publication]. Reston (VA): American College of Radiology (ACR); 2012. 10 p. [46 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Bennett DL, Daffner RH, Weissman BN, Blebea JS, Jacobson JA, Morrison WB, Resnik CS, Roberts CC, Rubin DA, Schweitzer ME, Seeger LL, Taljanovic M, Wise JN, Payne WK, Expert Panel on Musculoskeletal Imaging. ACR Appropriateness Criteria® nontraumatic knee pain. [online publication]. Reston (VA): American College of Radiology (ACR); 2008. 7 p.

Recommendations

Major Recommendations

ACR Appropriateness Criteria®

Clinical Condition: Nontraumatic Knee Pain

Variant 1: Child or adolescent: nonpatellofemoral symptoms. Initial examination.

Radiologic Procedure	Rating	Comments	RRL*
X-ray knee	9		☢
X-ray hip ipsilateral	1		☢☢☢
CT knee without contrast	1		☢☢
CT knee with contrast	1		☢☢
CT knee without and with contrast	1		☢☢
CT arthrography knee	1		☢☢
MRI knee without contrast	1		O

Radiologic Procedure	Rating	Comments	RRL*
MRI knee without and with contrast	1		O
MR arthrography knee	1		O
US knee	1		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 2: Child or adult: patellofemoral (anterior) symptoms. Initial examination.

Radiologic Procedure	Rating	Comments	RRL*
X-ray knee	9		☢
X-ray hip ipsilateral	1		☢☢☢
CT knee without contrast	1	The RRL for the adult procedure is ☢.	☢☢
CT knee with contrast	1	The RRL for the adult procedure is ☢.	☢☢
CT knee without and with contrast	1	The RRL for the adult procedure is ☢.	☢☢
CT arthrography knee	1	The RRL for the adult procedure is ☢.	☢☢
MRI knee without contrast	1		O
MRI knee without and with contrast	1		O
MR arthrography knee	1		O
US knee	1		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 3: Adult: nontrauma, nonlocalized pain. Initial examination.

Radiologic Procedure	Rating	Comments	RRL*
X-ray knee	9		☢
X-ray hip ipsilateral	1		☢☢☢
CT knee without contrast	1		☢
CT knee with contrast	1		☢
CT knee without and with contrast	1		☢
CT arthrography knee	1		☢
MRI knee without contrast	1		O
MRI knee without and with contrast	1		O
MR arthrography knee	1		O
US knee	1		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 4: Child or adolescent: nonpatellofemoral symptoms. Initial knee radiographs are negative or demonstrate joint effusion.

Radiologic Procedure	Rating	Comments	RRL*
MRI knee without contrast	9		O
MRI knee without and with contrast	3	Contrast may be helpful in the setting of unexplained synovitis and/or an unexplained prominent amount of joint fluid.	O
X-ray hip ipsilateral	2	Indicated if there is clinical evidence or concern for hip pathology causing referred pain to the knee.	☢☢☢
CT knee without contrast	1		☢☢
CT knee with contrast	1		☢☢
CT knee without and with contrast	1		☢☢
CT arthrography knee	1		☢☢
MR arthrography knee	1		O
US knee	1		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 5: Child or adult: patellofemoral (anterior) symptoms. Initial knee radiographs negative or demonstrate a joint effusion.

Radiologic Procedure	Rating	Comments	RRL*
MRI knee without contrast	9	If additional imaging is necessary, and if internal derangement is suspected.	O
MRI knee without and with contrast	3	Contrast may be helpful in the setting of unexplained synovitis and/or an unexplained prominent amount of joint fluid.	O
X-ray hip ipsilateral	1		☢☢☢
CT knee without contrast	1	The RRL for the adult procedure is ☢.	☢☢
CT knee with contrast	1	The RRL for the adult procedure is ☢.	☢☢
CT knee without and with contrast	1	The RRL for the adult procedure is ☢.	☢☢
CT arthrography knee	1	The RRL for the adult procedure is ☢.	☢☢
MR arthrography knee	1		O
US knee	1		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 6: Adult: nontrauma, nonlocalized pain. Initial knee radiographs are negative or demonstrate a joint effusion.

Radiologic Procedure	Rating	Comments	RRL*
MRI knee without contrast	9	If additional imaging is necessary and if internal derangement is suspected.	O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Radiologic Procedure	Rating	Comments	RRL*
X-ray hip ipsilateral	1	synovitis and/or an unexplained prominent amount of joint fluid.	☢☢☢
CT knee without contrast	1		☢
CT knee with contrast	1		☢
CT knee without and with contrast	1		☢
CT arthrography knee	1		☢
MR arthrography knee	1		O
US knee	1		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 7: Child or adolescent: nonpatellofemoral symptoms. Initial knee radiographs demonstrate osteochondral injuries (fracture/osteochondritis dissecans or a loose body).

Radiologic Procedure	Rating	Comments	RRL*
MRI knee without contrast	9		O
MR arthrography knee	6		O
CT arthrography knee	5	If MRI cannot be done.	☢☢
MRI knee without and with contrast	1		O
X-ray hip ipsilateral	1		☢☢☢
CT knee without contrast	1		☢☢
CT knee with contrast	1		☢☢
CT knee without and with contrast	1		☢☢
US knee	1		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 8: Adult: patellofemoral (anterior) symptoms. Initial knee radiographs demonstrate degenerative joint disease and/or chondrocalcinosis.

Radiologic Procedure	Rating	Comments	RRL*
X-ray hip ipsilateral	1		☢☢☢
CT knee without contrast	1		☢
CT knee with contrast	1		☢
CT knee without and with contrast	1		☢
CT arthrography knee	1		☢
MRI knee without contrast	1		O
MRI knee without and with contrast	1		O
MRI arthrography knee	1		O
US knee	1		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative

Radiologic Procedure	Rating	Comments	Radiation Level
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Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 9: Adult: Initial knee radiographs demonstrate inflammatory, crystalline, or degenerative joint disease (uni- to tri- compartmental sclerosis, hypertrophic spurs, joint space narrowing, and/or subchondral cysts).

Radiologic Procedure	Rating	Comments	RRL*
X-ray hip ipsilateral	1		☢☢☢
CT knee without contrast	1		☢
CT knee with contrast	1		☢
CT knee without and with contrast	1		☢
CT arthrography knee	1		☢
MRI knee without contrast	1	Consider for preoperative assessment.	O
MRI knee without and with contrast	1		O
MRI arthrography knee	1		O
US knee	1		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.




Variant 10: Adult: Initial knee radiographs demonstrate avascular necrosis.

Radiologic Procedure	Rating	Comments	RRL*
MRI knee without contrast	7	If needed for therapy.	O
MRI knee without and with contrast	1		O
CT knee without contrast	1		☢
CT knee with contrast	1		☢
CT knee without and with contrast	1		☢
CT arthrography knee	1		☢
MR arthrography knee	1		O
US knee	1		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 11: Adult: Initial knee radiographs demonstrate evidence of internal derangement (e.g., Second fracture, deep lateral femoral notch sign).

Radiologic Procedure	Rating	Comments	RRL*
MRI knee without contrast	9		O
CT arthrography knee	5	If MRI cannot be done.	☢
MRI knee without and with contrast	1		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Radiologic Procedure	Rating	Comments	RRL*
CT knee without contrast	1		
CT knee with contrast	1		
CT knee without and with contrast	1		
MR arthrography knee	1		O
US knee	1		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Summary of Literature Review

Background/Introduction

Nontraumatic knee pain in children, adolescents, and adults includes localized complaints such as anterior (parapatellar) pain and nonlocalized symptoms. The consensus of the committee is that the initial imaging study for nontraumatic knee pain should be radiography. When initial radiographs are nondiagnostic (normal findings or a joint effusion) and knee symptoms are suspicious for an internal derangement, the next indicated study is a magnetic resonance imaging (MRI) examination. MRI is also indicated when the patient has persistent knee pain and normal radiographs. MRI is more sensitive than radiography and provides more specific information compared with radionuclide bone scan. MRI of nontraumatic knee pain may document a joint effusion, communicating popliteal cysts, proliferative changes of the synovial membrane (such as, but not limited to lipoma arborescens, synovial chondromatosis, or synovitis of arthritis), osteophytes, subchondral cysts, articular cartilage loss, meniscal and/or ligamentous tears and/or degeneration, bone marrow edema (bearing in mind that actual edema is not a major constituent of this abnormal edema-like signal in the setting of osteoarthritis), fractures, and osteonecrosis.

Radiography

The consensus of the committee is that the initial imaging study for nontraumatic knee pain should be at least one frontal projection of one or both knees (anteroposterior [AP], Rosenberg, or tunnel), a lateral view of the affected knee, and tangential patellar view radiographs. In patients with nontraumatic knee pain, referred pain from the hip must be considered, and hip radiographs may need to be obtained if there is clinical evidence or clinical concern for hip pathology.

In elderly patients, the most common source of nontraumatic knee pain is osteoarthritis. Conventional radiographic diagnosis of degenerative joint disease (osteoarthritis) includes joint space narrowing, osteophytes, subchondral cysts, and sclerosis bordering the joint. Articular cartilage is evaluated indirectly on radiographs by joint space narrowing and changes in the subchondral bone. Routine radiographs are insensitive for assessing articular cartilage in the early stages of osteoarthritis, while in advanced disease, joint space narrowing on radiographs is usually an accurate assessment of cartilage loss. Standing radiographs have been reported to more accurately reflect medial and lateral joint compartment cartilage loss than supine radiographs; however, in the presence of a severe varus or valgus deformity, significant cartilage loss in the compartment that appears wide (due to the alignment deformity) may not be evident. A weight-bearing posteroanterior (PA) radiograph, obtained with knee flexion, has been reported to show the cartilage width of the posterior medial and lateral joint compartments more accurately than that a standing view obtained with the knee extended. The standing flexed view may be indicated in elderly patients with osteoarthritis when surgical intervention is being planned. Finally, one should bear in mind that a significant portion of the joint space narrowing may be due to meniscal extrusion or degeneration rather than hyaline cartilage loss in some patients. Additional imaging studies are not indicated in patients for whom radiographs are diagnostic of degenerative joint disease unless treatment options depend on additional imaging findings, or when symptoms are not explained by the radiographic findings (e.g., stress fractures).

Other nontraumatic causes of knee pain in adult patients include internal knee derangement (meniscal and ligament tears), stress fracture, subchondral insufficiency fracture, inflammatory arthritis, transient osteoporosis, and chronic regional pain syndrome. Meniscal tears are highly prevalent in symptomatic knee osteoarthritis; however, meniscal tears are also common incidental findings in middle-aged to older adults, with a majority of people over the age of 70 having an asymptomatic meniscal tear. Chronic anterolateral knee pain may also result from patellar tendon—lateral femoral condyle friction syndrome or iliotibial band syndrome (friction syndrome) both of which can be confirmed or excluded by MRI.

Magnetic Resonance Imaging

When initial radiographs are nondiagnostic (normal findings or a joint effusion) and knee symptoms are suspicious for an internal derangement, the next indicated study is an MRI examination. MRI is also indicated when the patient has persistent knee pain and normal radiographs. MRI is more

sensitive than radiography and provides more specific information compared with radionuclide bone scan. MRI of nontraumatic knee pain may document a joint effusion, communicating popliteal cysts, proliferative changes of the synovial membrane (such as, but not limited to lipoma arborescens, synovial chondromatosis, or synovitis associated with arthritis), osteophytes, subchondral cysts, articular cartilage loss, meniscal and/or ligamentous tears and/or degeneration, extensor mechanism disorders, bone marrow edema (bearing in mind that actual edema is not a major constituent of this abnormal edema-like signal in the setting of osteoarthritis), fractures, and osteonecrosis.

A suprapatellar joint effusion is readily detected on a lateral radiograph of the knee; however, the extent of a joint effusion, the presence of a communicating synovial (popliteal) cyst, or synovitis is readily identified on MRI. Subchondral cysts are easily detected on MRI because of the tomographic quality, multiplanar imaging capability, and the superb sensitivity to fluid- and fat-containing tissues. Cartilage pathology, both articular and meniscal, can be evaluated directly on MRI, and demonstration depends on the location of the abnormality and the pulse sequences used.

Magnetic resonance arthrography performed with an intra-articular injection of dilute gadolinium solution or with an intravenous injection of gadolinium contrast to improve cartilage evaluation has been investigated; however, noncontrast MRI (at both 1.5 T and 3.0 T) has been reported as being accurate for cartilage abnormalities.

Patellofemoral cartilage loss has been reported to be closely associated with chronic knee pain symptoms. MRI has been reported to be more accurate than physical examination for identifying more severe (grades II to IV) lesions of chondromalacia patellae, and may be an appropriate screening tool before arthroscopy.

Transient osteoporosis is characterized by self-limited pain and radiographically demonstrable osteopenia. The osteopenia typically develops within eight weeks after the onset of pain.

MRI is useful to identify a subchondral insufficiency fracture as the initial injury from which localized osteonecrosis may result and which, in the past, was termed spontaneous osteonecrosis. MRI can also detect osteonecrosis of the medial tibial plateau associated with tibial stress fractures. Subchondral insufficiency fracture — most commonly involving the medial femoral condyle, and most often found in middle-aged and elderly females — may have normal radiographs for months, followed by subchondral collapse, fragmentation of the articular cartilage, and progressive osteoarthritis.

Bone marrow edema seen on MRI occurs in association with, or independent of, transient osteoporosis, subchondral insufficiency fractures, and stress fractures; MRI is highly sensitive for detecting these abnormalities. In adult patients with conventional radiograph diagnosis of an osteochondral injury such as osteochondritis dissecans or subchondral insufficiency fracture, an MRI examination may be indicated if an additional injury is suspected clinically or when it is necessary to determine the status of the articular cartilage over the area of abnormality. In the child or adolescent with radiographic evidence of osteochondritis dissecans, an MRI is indicated to determine the best method of treatment. Finally, MRI is not indicated to confirm a stress fracture that is evident on the radiographic study.

In patients with radiographic evidence of inflammatory arthritis of the knee, the consensus of the panel is that a knee MRI is usually not indicated for preoperative differentiation of pannus from effusion or for evaluation of erosion. An aspiration for crystals may be indicated; however, the use of medical imaging (such as fluoroscopic guidance, ultrasound [US] guidance, or arthrographic confirmation) may not be necessary.

Computed Tomography Arthrography

When an intra-articular abnormality is suspected in a patient with claustrophobia, with a large body habitus, or who cannot for some reason tolerate an MRI examination, or when there is contraindication to an MRI, a computed tomography (CT) arthrogram may be used instead of the MRI to evaluate the cruciate ligaments, menisci, and articular cartilage. CT without intra-articular contrast has very low sensitivity for internal knee derangements.

Ultrasound

In a patient with nontraumatic knee pain that is felt to be arising from a popliteal cyst, US is an effective imaging method for confirming or ruling out a popliteal cyst. It has been shown to be as accurate as MRI and can be less time-consuming to perform. In diagnosing a popliteal cyst by US, it is important to visualize the neck of the cyst between the semimembranosus tendon and medial head of the gastrocnemius muscle.

Summary

- The initial imaging examination for nontraumatic knee pain is radiography.
- An MRI examination for nontraumatic knee pain is indicated when the pain is persistent and conventional radiographs are nondiagnostic or when additional information is necessary before instituting treatment.
- An MRI is not indicated before a physical examination or routine conventional radiographs, or when there is diagnostic radiographic evidence of severe degenerative joint diseases, inflammatory arthritis, stress fracture, osteonecrosis, or reflex sympathetic dystrophy, for

which additional imaging is not going to alter the treatment plan.

Abbreviations

- CT, computed tomography
- MRI, magnetic resonance imaging
- US, ultrasound

Relative Radiation Level Designations

Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
O	0 mSv	0 mSv
☢	<0.1 mSv	<0.03 mSv
☢ ☢	0.1-1 mSv	0.03-0.3 mSv
☢ ☢ ☢	1-10 mSv	0.3-3 mSv
☢ ☢ ☢ ☢	10-30 mSv	3-10 mSv
☢ ☢ ☢ ☢ ☢	30-100 mSv	10-30 mSv
*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (e.g., region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as "Varies."		

Clinical Algorithm(s)

Algorithms were not developed from criteria guidelines.

Scope

Disease/Condition(s)

Nontraumatic knee pain

Guideline Category

Diagnosis

Evaluation

Clinical Specialty

Family Practice

Geriatrics

Internal Medicine

Orthopedic Surgery

Pediatrics

Radiology

Rheumatology

Intended Users

Health Plans

Hospitals

Managed Care Organizations

Physicians

Utilization Management

Guideline Objective(s)

To evaluate the appropriateness of initial radiologic examinations for patients with nontraumatic knee pain

Target Population

Patients with nontraumatic knee pain

Interventions and Practices Considered

1. X-ray
 - Knee
 - Ipsilateral hip
2. Magnetic resonance imaging (MRI) knee
 - Without contrast
 - Without and with contrast
3. MR arthrography knee
4. Ultrasound (US) knee
5. Computed tomography (CT) knee
 - Without contrast
 - With contrast
 - Without and with contrast
6. CT arthrography knee

Major Outcomes Considered

Utility of radiologic examinations in differential diagnosis

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature Search Procedure

The Medline literature search is based on keywords provided by the topic author. The two general classes of keywords are those related to the condition (e.g., ankle pain, fever) and those that describe the diagnostic or therapeutic intervention of interest (e.g., mammography, MRI).

The search terms and parameters are manipulated to produce the most relevant, current evidence to address the American College of Radiology Appropriateness Criteria (ACR AC) topic being reviewed or developed. Combining the clinical conditions and diagnostic modalities or therapeutic procedures narrows the search to be relevant to the topic. Exploding the term "diagnostic imaging" captures relevant results for diagnostic topics.

The following criteria/limits are used in the searches.

1. Articles that have abstracts available and are concerned with humans.
2. Restrict the search to the year prior to the last topic update or in some cases the author of the topic may specify which year range to use in the search. For new topics, the year range is restricted to the last 5 years unless the topic author provides other instructions.
3. May restrict the search to Adults only or Pediatrics only.
4. Articles consisting of only summaries or case reports are often excluded from final results.

The search strategy may be revised to improve the output as needed.

Number of Source Documents

The total number of source documents identified as the result of the literature search is not known.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Strength of Evidence Key

Category 1 - The conclusions of the study are valid and strongly supported by study design, analysis, and results.

Category 2 - The conclusions of the study are likely valid, but study design does not permit certainty.

Category 3 - The conclusions of the study may be valid but the evidence supporting the conclusions is inconclusive or equivocal.

Category 4 - The conclusions of the study may not be valid because the evidence may not be reliable given the study design or analysis.

Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

The topic author drafts or revises the narrative text summarizing the evidence found in the literature. American College of Radiology (ACR) staff draft an evidence table based on the analysis of the selected literature. These tables rate the strength of the evidence for all articles included in the narrative text.

The expert panel reviews the narrative text, evidence table, and the supporting literature for each of the topic-variant combinations and assigns an appropriateness rating for each procedure listed in the table. Each individual panel member forms his/her own opinion based on his/her interpretation of the available evidence.

More information about the evidence table development process can be found in the ACR Appropriateness Criteria® Evidence Table Development document (see the "Availability of Companion Documents" field).

Methods Used to Formulate the Recommendations

Description of Methods Used to Formulate the Recommendations

Modified Delphi Technique

The appropriateness ratings for each of the procedures included in the Appropriateness Criteria topics are determined using a modified Delphi methodology. A series of surveys are conducted to elicit each panelist's expert interpretation of the evidence, based on the available data, regarding the appropriateness of an imaging or therapeutic procedure for a specific clinical scenario. American College of Radiology (ACR) staff distributes surveys to the panelists along with the evidence table and narrative. Each panelist interprets the available evidence and rates each procedure. The surveys are completed by panelists without consulting other panelists. The ratings are a scale between 1 and 9, which is further divided into three categories: 1, 2, or 3 is defined as "usually not appropriate"; 4, 5, or 6 is defined as "may be appropriate"; and 7, 8, or 9 is defined as "usually appropriate." Each panel member assigns one rating for each procedure per survey round. The surveys are collected and the results are tabulated, de-identified and redistributed after each round. A maximum of three rounds are conducted. The modified Delphi technique enables each panelist to express individual interpretations of the evidence and his or her expert opinion without excessive bias from fellow panelists in a simple, standardized and economical process.

Consensus among the panel members must be achieved to determine the final rating for each procedure. Consensus is defined as eighty percent (80%) agreement within a rating category. The final rating is determined by the median of all the ratings once consensus has been reached. Up to three rating rounds are conducted to achieve consensus.

If consensus is not reached, the panel is convened by conference call. The strengths and weaknesses of each imaging procedure that has not reached consensus are discussed and a final rating is proposed. If the panelists on the call agree, the rating is accepted as the panel's consensus. The document is circulated to all the panelists to make the final determination. If consensus cannot be reached on the call or when the document is circulated, "No consensus" appears in the rating column and the reasons for this decision are added to the comment sections.

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The recommendations are based on analysis of the current literature and expert panel consensus.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Selection of appropriate radiologic imaging procedures to evaluate patients with nontraumatic knee pain

Potential Harms

Relative Radiation Level (RRL)

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Patients in the pediatric age group are at inherently higher risk from exposure, both because of organ sensitivity and longer life expectancy (relevant to the long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are lower as compared to those specified for adults. Additional information regarding radiation dose assessment for imaging examinations can be found in the American College of Radiology (ACR) Appropriateness Criteria® Radiation Dose Assessment Introduction document (see the "Availability of Companion Documents" field).

Qualifying Statements

Qualifying Statements

The American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those examinations generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Living with Illness

IOM Domain

Identifying Information and Availability

Bibliographic Source(s)

Bennett DL, Nelson JW, Weissman BN, Kransdorf MJ, Appel M, Bencardino JT, Fries IB, Hayes CW, Hochman MG, Jacobson JA, Luchs JS, Math KR, Murphey MD, Newman JS, Rubin DA, Scharf SC, Small KM, Expert Panel on Musculoskeletal Imaging. ACR Appropriateness Criteria® nontraumatic knee pain. [online publication]. Reston (VA): American College of Radiology (ACR); 2012. 10 p. [46 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

1995 (revised 2012)

Guideline Developer(s)

American College of Radiology - Medical Specialty Society

Source(s) of Funding

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

Guideline Committee

Committee on Appropriateness Criteria, Expert Panel on Musculoskeletal Imaging

Composition of Group That Authored the Guideline

Panel Members: D. Lee Bennett, MD, MA (*Principal Author*); Jared W. Nelson, MD (*Research Author*); Barbara N. Weissman, MD (*Panel Chair*); Mark J. Kransdorf, MD (*Panel Vice-chair*); Marc Appel, MD; Jenny T. Bencardino, MD; Ian Blair Fries, MD; Curtis W. Hayes, MD; Mary G. Hochman, MD; Jon A. Jacobson, MD; Jonathan S. Luchs, MD; Kevin R. Math, MD; Mark D. Murphey, MD; Joel S. Newman, MD; David A. Rubin, MD; Stephen C. Scharf, MD; Kirstin M. S. Small, MD

Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Bennett DL, Daffner RH, Weissman BN, Blebea JS, Jacobson JA, Morrison WB, Resnik CS, Roberts CC, Rubin DA, Schweitzer ME, Seeger LL, Taljanovic M, Wise JN, Payne WK, Expert Panel on Musculoskeletal Imaging. ACR

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Guideline Availability

Electronic copies: Available from the [American College of Radiology \(ACR\) Web site](#) .

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

Availability of Companion Documents

The following are available:

- ACR Appropriateness Criteria®. Overview. Reston (VA): American College of Radiology; 2 p. Electronic copies: Available in Portable Document Format (PDF) from the [American College of Radiology \(ACR\) Web site](#) .
- ACR Appropriateness Criteria®. Literature search process. Reston (VA): American College of Radiology; 1 p. Electronic copies: Available in PDF from the [ACR Web site](#) .
- ACR Appropriateness Criteria®. Evidence table development – diagnostic studies. Reston (VA): American College of Radiology; 2013 Nov. 3 p. Electronic copies: Available in PDF from the [ACR Web site](#) .
- ACR Appropriateness Criteria®. Radiation dose assessment introduction. Reston (VA): American College of Radiology; 2 p. Electronic copies: Available in PDF from the [ACR Web site](#) .
- ACR Appropriateness Criteria®. Procedure information. Reston (VA): American College of Radiology; 1 p. Electronic copies: Available in PDF from the [ACR Web site](#) .
- ACR Appropriateness Criteria® nontraumatic knee pain. Evidence table. Reston (VA): American College of Radiology; 2012. 14 p. Electronic copies: Available in PDF from the [ACR Web site](#) .

Patient Resources

None available

NGC Status

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